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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/014,407	12/14/2001	Minoru Suzuki	011622	9744

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EXAMINER

PIERRE, KENELT

ART UNIT

PAPER NUMBER

2822

DATE MAILED: 06/19/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/014,407

Applicant(s)

SUZUKI ET AL.

Examiner

KEN PIERRE

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 31 May 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 to 11 is/are pending in the application.
- 4a) Of the above claim(s) 7 to 11 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 to 6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to the election filed May 31, 2002.

Election/Restrictions

2. Claims 7 to 11 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected group, there being no allowable generic or linking claim. Election was made **without** traverse in Paper No. 1. Claims 7 to 11 are cancelled as requested by applicant. Claims 1 to 6 are pending.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 to 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Webb et al (5,479,031) in view of Planey (3,772,577).

Regarding claims 1 to 6, Webb et al disclose (ABSTRACT) an overvoltage protection device 90, (FIG.4, 5). (Col. 2; lines 30 to 40) The Semiconductor device has four layers of alternating conductivity (NPNP or PNPN). The four layers include an emitter layer, an upper base layer, a mid-region layer and a lower base layer, respectively. Two metal terminals are coupled with the emitter and lower base regions of the device, respectively. (Col. 6; lines 33 to 35) The higher doping level needed to form the buried region is higher than the rest of the doping in the device. (Col. 6; lines

50 to 55) (FIG.2) The emitter region 39 and the shorting dots 37 are coupled to the metal junction 35. The mid-region layer 44 possesses buried regions 42. (Col. 6; lines 56 to 60) The lower base region 46 is placed beneath the mid-region layer 44 and in contact with the metal contact 48. The lower base is either heavily doped with N type conductivity or lightly is doped with N conductivity. (Col. 8; lines 40 to 54)(FIG. 4, 5) The device 90 has two metal contacts 94 and 114, and two four-layer devices. On the right side of the device, there is an upper base region 100, a mid-region layer 104 and a lower base region 106. On the left of the device there is an upper base region of 106, a mid-region layer 104 and a lower base region of 100. (Col. 8; lines 55 to 60) Emitter region 116 is connected with the metal contact 114. The mid-region layer 104 possesses the buried regions 119. (Col. 9; lines 30 to 35) The substrate is made of semiconductor silicon. (Col. 9; lines 35 to 50) An upper base region layer 40 is then placed above the mid-region layer 44. A lower base region layer 46 is placed underneath the mid-region layer 44 after the upper base region 40 is formed, or at the same time.

However, Webb et al do not disclose that the surface of the semiconductor has moat isolation or trenches that are filled with oxide and that surround the emitters.

Planey (ABSTRACT) (FIG 1-4) discloses a high voltage semiconductor PN junction device of mesa with guard ring or moat 12 circumscribing the mesa. (Col. 1; lines 20 to 25) The moat is subsequently filled with an insulating material or oxide.

✓ (Col. 1; lines 40 to 45) Circumscribing region 6 is a moat 12 which may contain an insulating material such as silicon dioxide. (Col. 3; lines 20 to 25) After the heavily doped regions 8 and 10 are formed; the moat 12 is formed to intimately separate region 8 and region 10.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use ring-shaped moats around top and bottom emitters, which is heavily doped because (Col. 1; lines 1 to 20) during high voltage and high temperature operation, any inversion paths, which tend to form will terminate in the highly doped region, since the moat is around a heavily doped region, as taught per Planey reference.

Conclusion

4. **THIS ACTION IS MADE NON-FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this non-final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this non-final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date

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of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this non-final action.

5. Any inquiry concerning this communication or earlier communication from the examiner should be directed to Ken Pierre whose telephone number is (703) 305-4002. The examiner can normally be reach on Monday-Friday from 8:30AM to 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor Carl Whitehead, Jr. can be reach at (703) 308-4940. The fax telephone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7724 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or processing should be directed to the receptionist whose telephone number is (703) 308-0956.

KP

June 11, 2002


CARL WHITEHEAD, JR.
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800